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1. Euroscreen **Recombinant cell** lines - US - new. soon available. Mammalian **recombinant cell** lines [US]. If you do not find the receptor of interest in the following list, it might ...
   www.euroscreen.be/02_02_01.html search within this site

2. HeLa-IkB **Recombinant Cell** Line - HeLa-I?B **Recombinant Cell** Line. Measures Degradation of I?B; Functional Cell based Assay that does not require Labeled Ligand; Sensitive ...
   www.discoverx.com/Html/Products/invivo/hela_IkB.htm search within this site

3. Pangene: **Recombinant Cell** Construction - User Account: Sign In. **Recombinant Cell** Construction. Pangene's **recombinant cell** services will take the cDNA or gDNA clones from your ...
   https://www.pangene.com/services/rcell/ search within this site

4. TNF-alpha, Soluble, Mouse, **Recombinant, Cell** Culture Grade, Kit[... - ...
   TNF-alpha, Soluble, Mouse, **Recombinant, Cell** Culture Grade, Kit[1 Kit] [T1038]. Description: Kit contains 50 ug of rmsTNF-alpha plus 2x50ug of an enhancer. ...
   www.agscientific.com/Item/T1038.htm search within this site

5. Development and Utilization of a **Recombinant Cell** Bioassay to ... - DEVELOPMENT AND UTILIZATION OF A **RECOMBINANT CELL** BIOASSAY TO DETECT DIOXIN-LIKE CHEMICALS IN HUMAN AND WILDLIFE SERUM AND MILK SAMPLES. ...
   www.tsrtp.ucdavis.edu/funded_projects/97.98.RFP/abstracts/M.%20Denison%20abst.html search within this site

6. EVALUATION AND USE OF A **RECOMBINANT CELL** BIOASSAY TO DETECT AND ... (PDF) - EVALUATION AND USE OF A **RECOMBINANT CELL** BIOASSAY TO DETECT AND QUANTIFY INTERNAL PETROLEUM EXPOSURE IN SEA OTTERS (ENHYDRA LUTRIS) EXPOSED TO OR AT RISK OF ...
   www.vetmed.ucdavis.edu/owcn/pdfs/EVALUATION_AND_USE_OF_A_RECOMBINANT.pdf search within this site

7. SIBIA Neurosciences, Inc. v. Cadus Pharm. Corp. - ... comparing the amount of transcription of a reporter gene or the amount of reporter gene product expressed in a first **recombinant cell** in the presence of the ...
   www.patentcribsheet.com/Cases/sibia.html

8. Lib #: WA20323 - A New **Recombinant Cell** Bioassay for ... - ... Title: A New **Recombinant Cell** Bioassay for Utrasensitive Determination of Serum Estrogenic Bioactivity in Children. File Number: WA20323. ...
   www2.waters.com/Watprod.nsf/docs/WA20323.html

9. SBRP 2000-2005 Programs - ... Patents: Bioassay for detecting 2,3,7,8-tetrachlorodibenzo-para-dioxin and TCDD-like compounds and novel **r combinant cell** line useful therefore. 1998. ...
www-apps.niehs.nih.gov/sbrp/program2000/PSearch.cfm?Pnum=4207&onum=342 search within this site

10. **Recombinant Cell** Surface Receptors - **Recombinant Cell** Surface Receptors. MJ Browne **Recombinant Cell** Surface Receptors. Biology Electrons in Solids... Democracy in Deficit... ...
www.videogames4u.co.uk/**recombinant-cell**-surface-receptors-924-531-265-4.html search within this site

11. Ligands (PDF) - ... CNTF CNTF, **recombinant Cell** Culture 01-195 25 µg $299 Anti-Human Fas Ligand (clone B-R17) N FC / H 05-571 200 µg $289 Fas Ligand (FasL), Membrane Bound Cell ...
www.upstate.com/img/pdf/ligands.pdf search within this site

12. Sample Paper (PDF) - ... various di-cistronic expression cassettes have been developed and optimised to allow the rapid cloning and isolation of highly expressing **recombinant cell** lines ...
www.alarpm.org.au/wc5&9/papers.PDF search within this site

13. Pharmaceutical Technology - Euroscreen - De-Orphanizing G Protein ... - ... These include: Mammalian **recombinant cell** lines (more than 70); Recombinant receptors as membrane preparations (more than 65); ... MAMMALIAN **RECOMBINANT CELL** LINES. ...
www.pharmaceutical-technology.com/contractors/compound_man/euroscreen/

14. Research Scientist, Dept. Cell Biology/Pharmaceutical Development (PDF) - ... Location : Western suburbs of Philadelphia, PA Description : Use Molecular Biology approaches to optimize **recombinant cell** lines as it pertains to their ...
www.egr.msu.edu/ispe/employment/phd_pharm.pdf

15. JIN - Laboratory Head Applied Cell Biology - Dec 2002 - ... issues (personnel,investments,budget) as well as for the following duties: 1. Creation and characterization of high-expression **recombinant cell** lines for ...
www.esact.org/jin/jobs/021223ro.html search within this site

16. Merck Sharp & Dohme - The Neuroscience Research Centre - ... - ... The cell culture facility is a centre of expertise with two main roles: •, to maintain and propagate cell lines, and generate novel **recombinant cell** lines. ...
www.msd-nrc.co.uk/pages/science/biology/molbio_bio_cell.htm search within this site

17. BioDetection Systems - ... Species-specific **recombinant cell** lines as bioassay systems for the detection of 2,3,7,8-tetrachlorodibenzo-p-dioxin-like chemicals. ...
www.biodetectionsystems.com/lit_ldr.html search within this site

18. Microbial Cell Factories | Full text | Old bugs for new tasks; ... - ... the emerging need for a wide-spectrum, efficient protein production in the proteomics era has favoured a deeper analysis of the **recombinant cell** physiology. ...
www.microbialcellfactories.com/content/1/1/4 search within this site

19. http://vax.wcsu.edu/courses/bio/215/Unit4/Genetics2.ppt (MICROSOFT POWERPOINT) - ... New **recombinant cell**. Starting cell. DNA pieces in environment. ... TRANSDUCTION, STEP 5. New **recombinant cell**. TRANSDUCTION COMPLETE. New **recombinant cell**. Starting cell. ...
vax.wcsu.edu/courses/bio/215/Unit4/Genetics2.ppt

20. Intota - Search Results - ... Related Search Terms. -, **recombinant cell**. -, genetic engineering. ... , recombinant protein. -, recombinant antibody. Search Results for '**rec mbinant cell**' ...
biospace.intota.com/multisearch.asp?strSearchType=all&strQuery=recombinant%20cell search within this site

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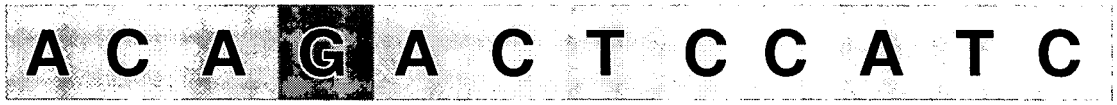
BACTERIAL GENETICS, CONTINUED

MUTATION

Change in genetic material (base sequence of the DNA)

TYPES OF MUTATION

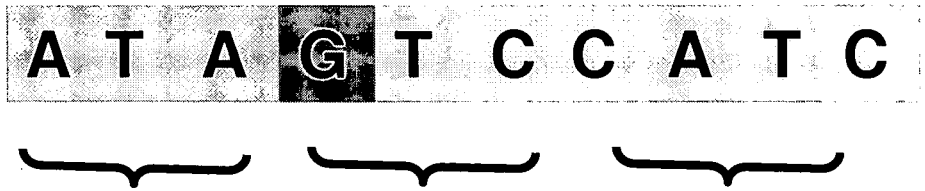
Base substitution



(May or may not be Missense)

Nonsense

Frameshift



HOW DOES MUTATION OCCUR??

Mistakes in replication - chemical mutagens - radiation

Compounds that cause mutation are called mutagens

Mutations that occur without seeming cause are 'spontaneous'

Cells have safeguards and repair mechanisms

MUTATIONS CAN BE BENEFICIAL!

THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THQ ONE BIG FLY HAD ONE RED EYE

Point mutation, missense

THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE QBI GFL YHA DON ERE DEY E

Frameshift, insertion

THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG

Nonsense

THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG HAD ONE RED EYE

Deletion

THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY ONE BIG FLY HAD ONE RED EYE

Tandem duplication (repeats)

THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG FLY HAD ONE RED EYE
THE ONE BIG WET FLY HAD ONE RED EYE

Insertion

Why is mutation such a significant process in biology???

It makes natural selection and evolution possible

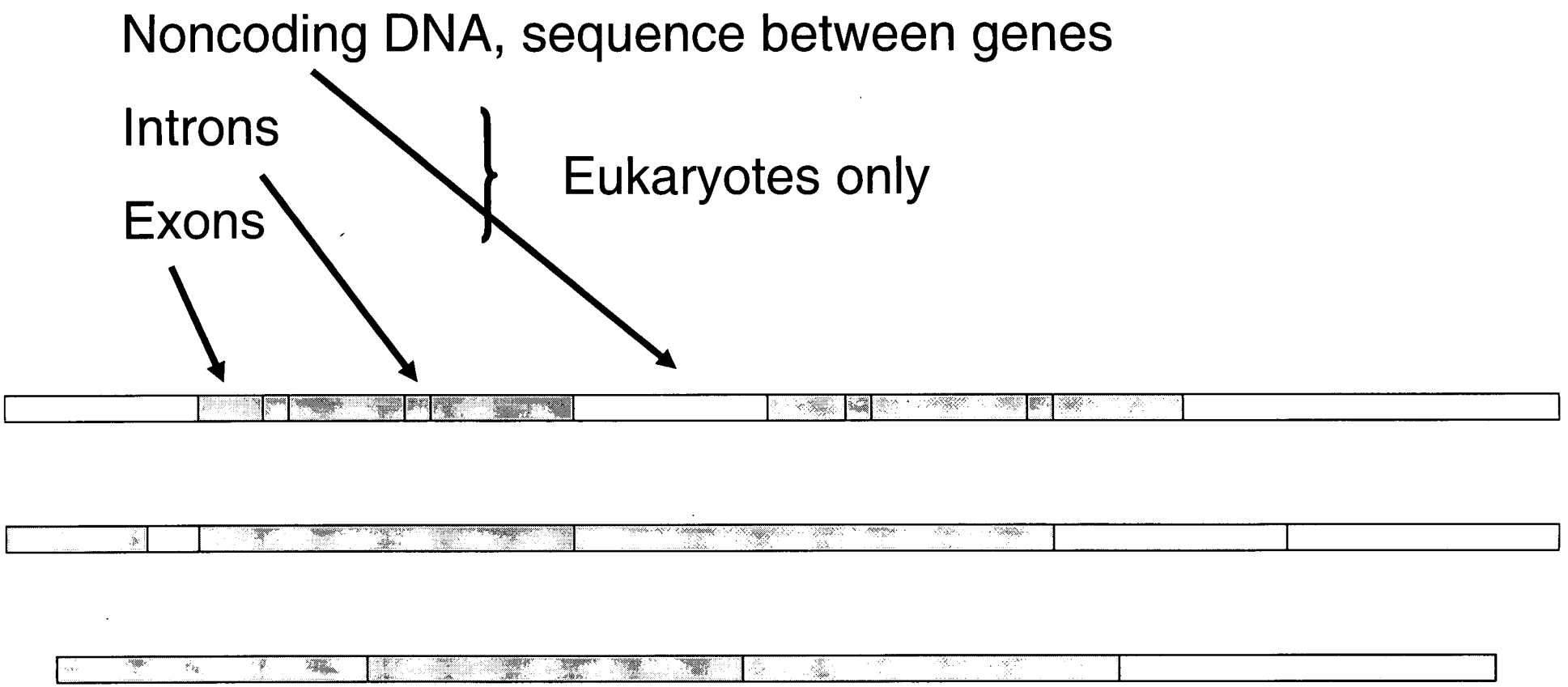
It's the foundation for all the variability we see around us (variability is key to our survival, and that of other species, including bacteria)

Mutations are the cause of genetic (inherited) disease

Mutation allows bacteria to respond to environmental change that we thrust upon them (e.g. antibiotic resistance)

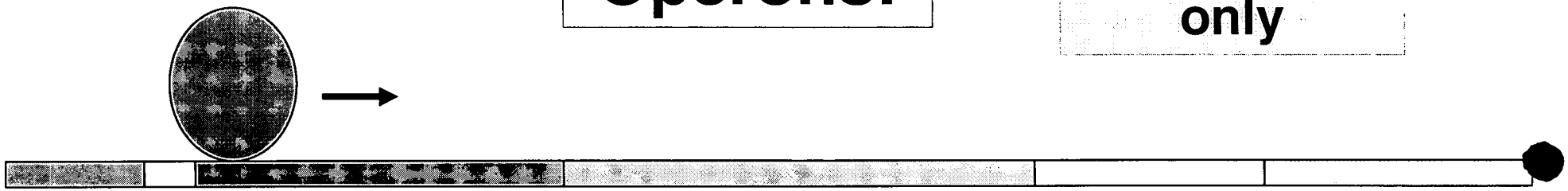
Deliberate and directed mutation is something we do in the laboratory to learn about genes and proteins. Mutant bacteria and mice have taught us VOLUMES about the human genome!

INTRONS, EXONS, NON-CODING DNA



Operons!

Prokaryotes only

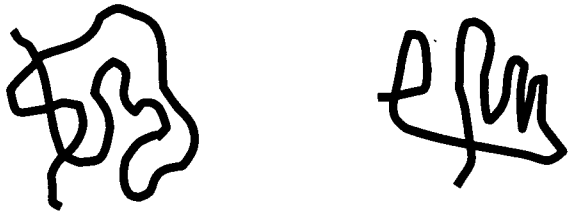


Gene 1

Gene 2

1 mRNA

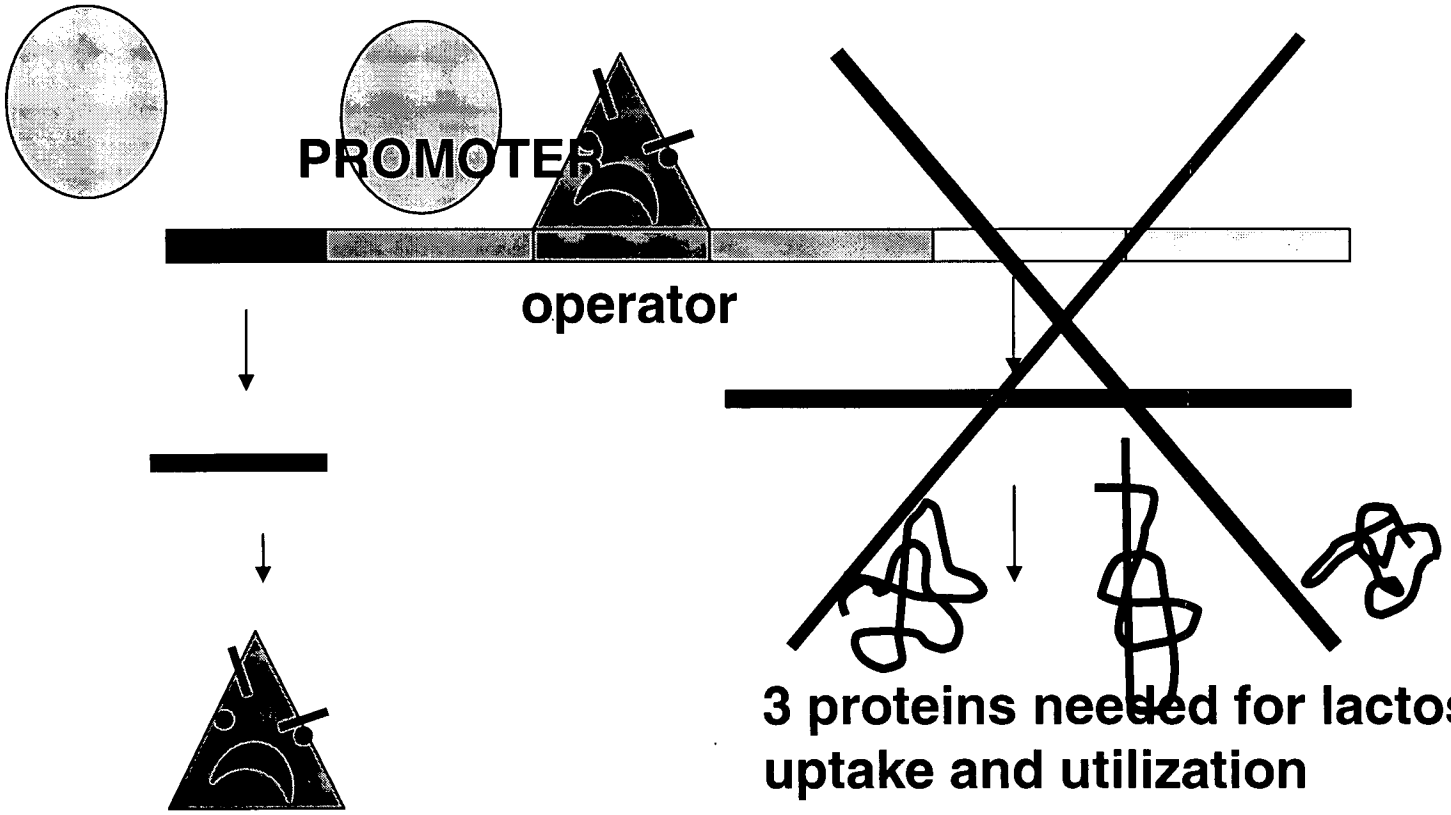
2,3 or more proteins!

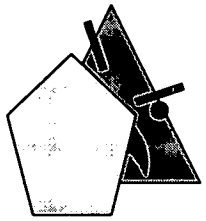


PROTEIN 1

PROTEIN 2

The famous 'Lac' operon





An inducer binds to repressor, rendering it non-functional

How are prokaryotes different from eukaryotes, genetically?

smaller genome

no nucleus

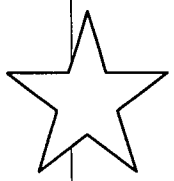
1 circular chromosome

no introns

less non-coding DNA

have operons

Let's review

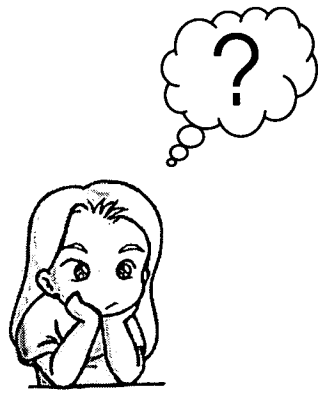


SHARE DNA by transduction, conjugation, and transformation

Prokaryotes reproduce by producing clonal copies of themselves.

Therefore, new combinations are not possible…..hmmm

Or are they?????



YES - NEW CHROMOSOMAL COMBINATIONS ARE POSSIBLE THROUGH MUTATION (occurs in eukaryotes also)

AND YES - NEW CHROMOSOMAL COMBINATIONS ARE POSSIBLE THROUGH 3 TYPES OF RECOMBINATION that do not occur in eukaryotes!

1. TRANSFORMATION

Transformation occurs when cells take up pieces of DNA from the environment

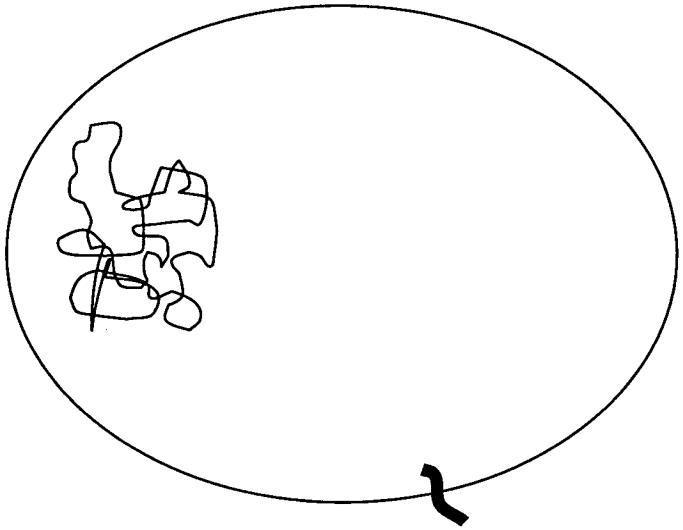
TRANSFORMATION

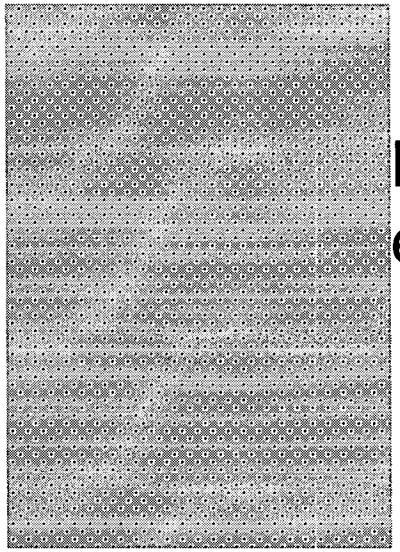
Pieces of DNA are taken into a bacterial cell from the environment

- The DNA usually comes from other cells that have broken apart

Cells only take up DNA under certain conditions

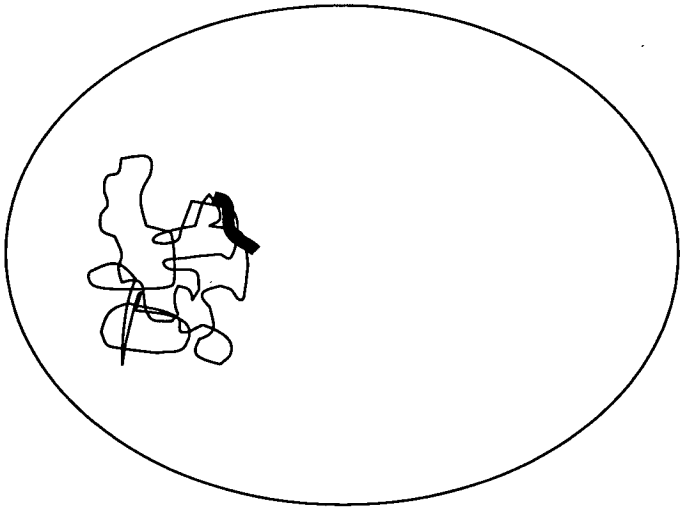
Frederick Griffith first discovered this process in 1928, using *Streptococcus pneumoniae*





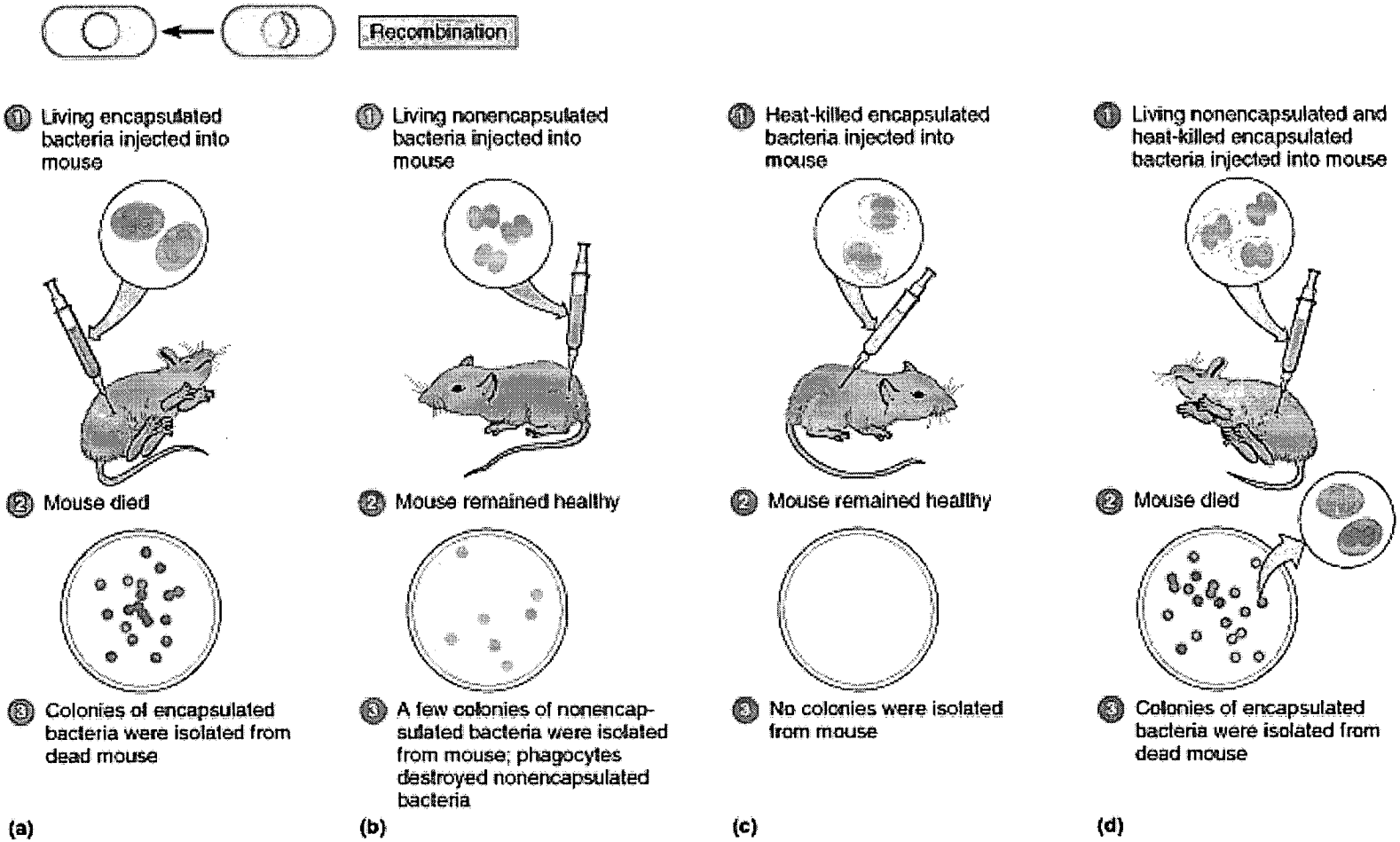
DNA pieces in environment

Starting cell

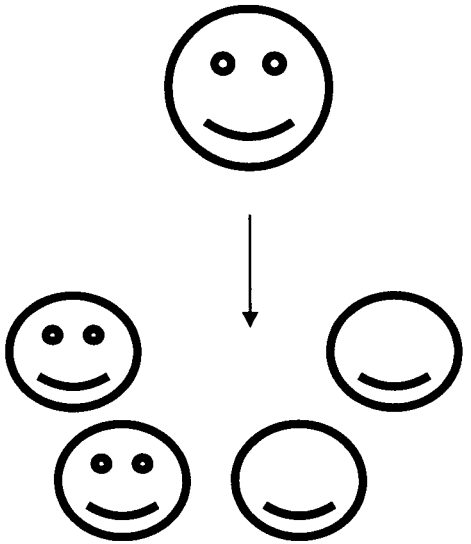


New recombinant cell

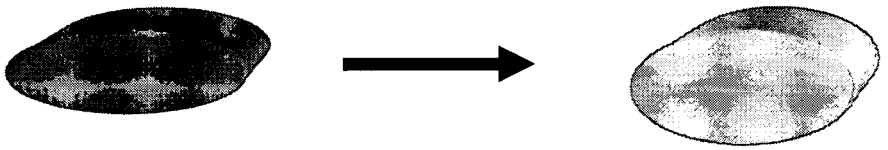
Please read about Griffith's Experiment in your text



VERTICAL GENE TRANSFER



HORIZONTAL GENE TRANSFER

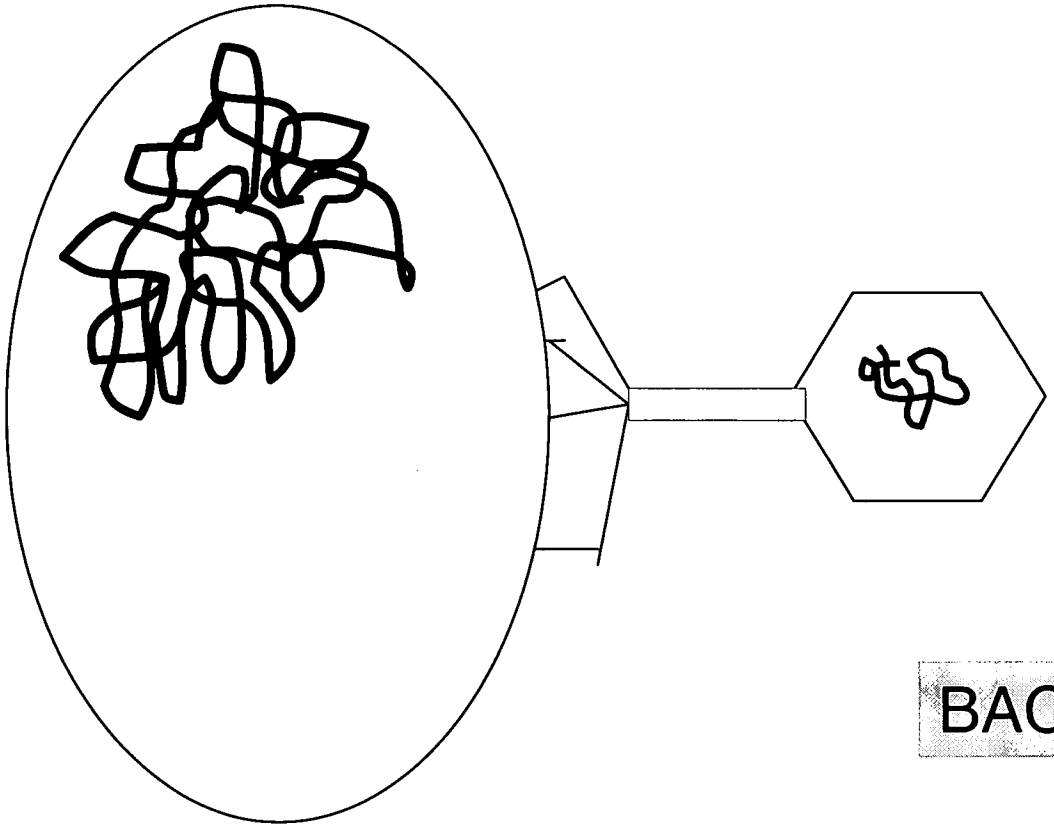


donor

recipient

2. TRANSDUCTION

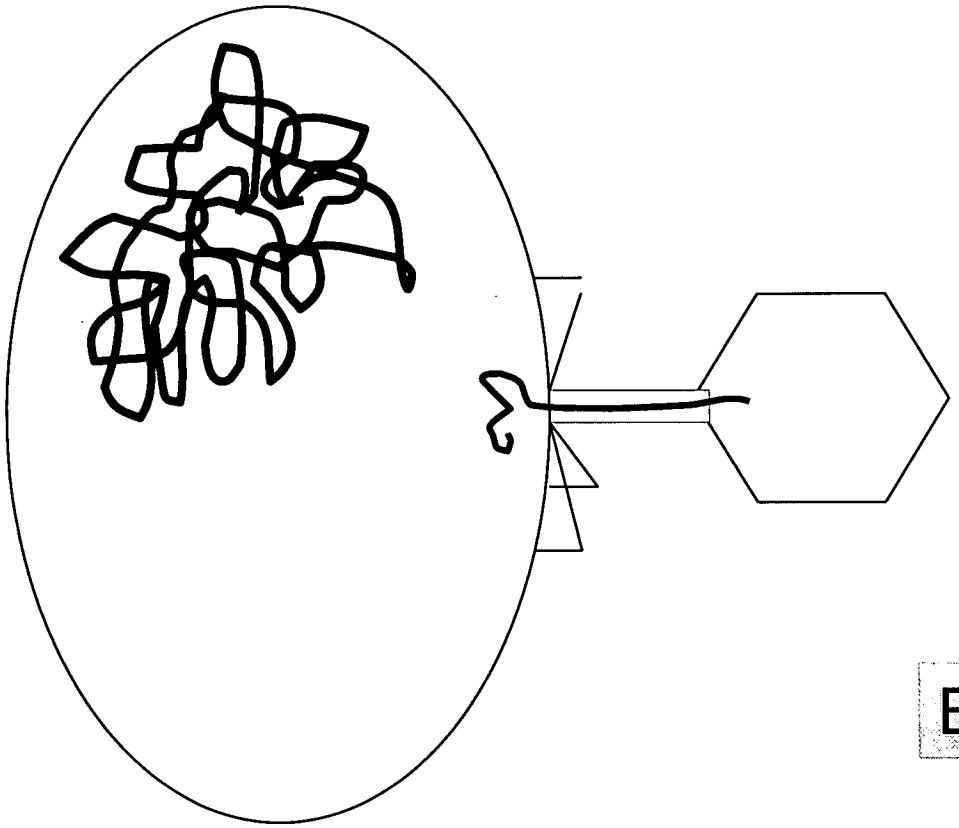
Transduction occurs when bacteriophage infect cells, and carry bacterial DNA from cell to cell.



BACTERIOPHAGE

STARTING CELL

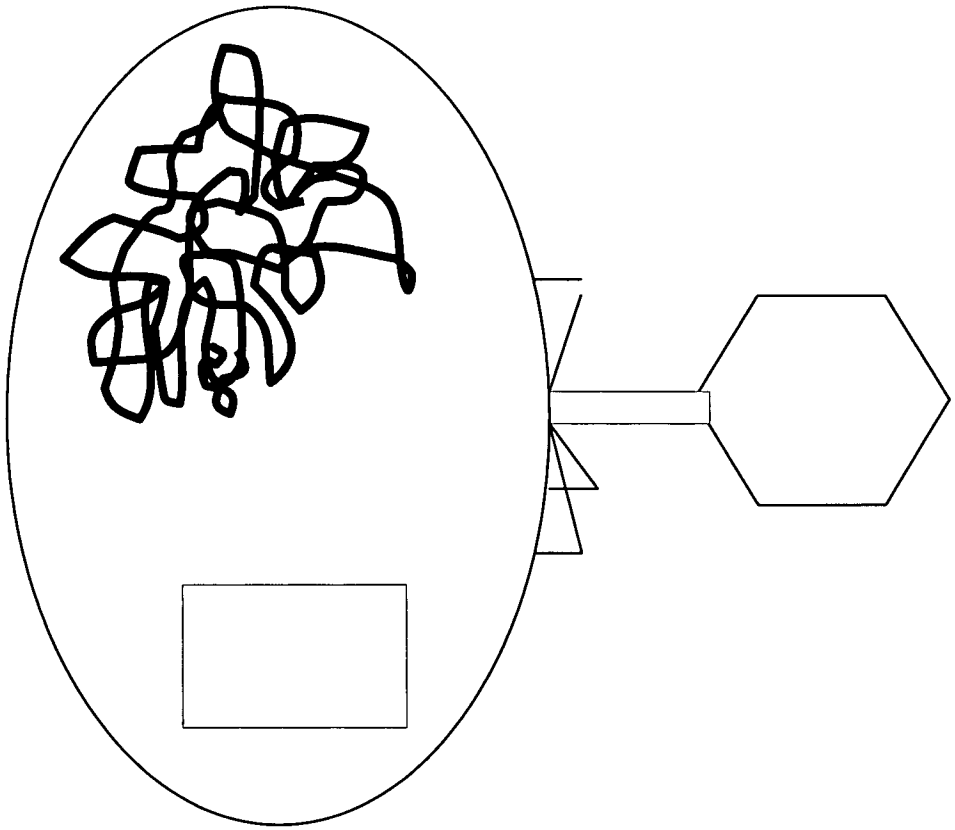
TRANSDUCTION, STEP 1



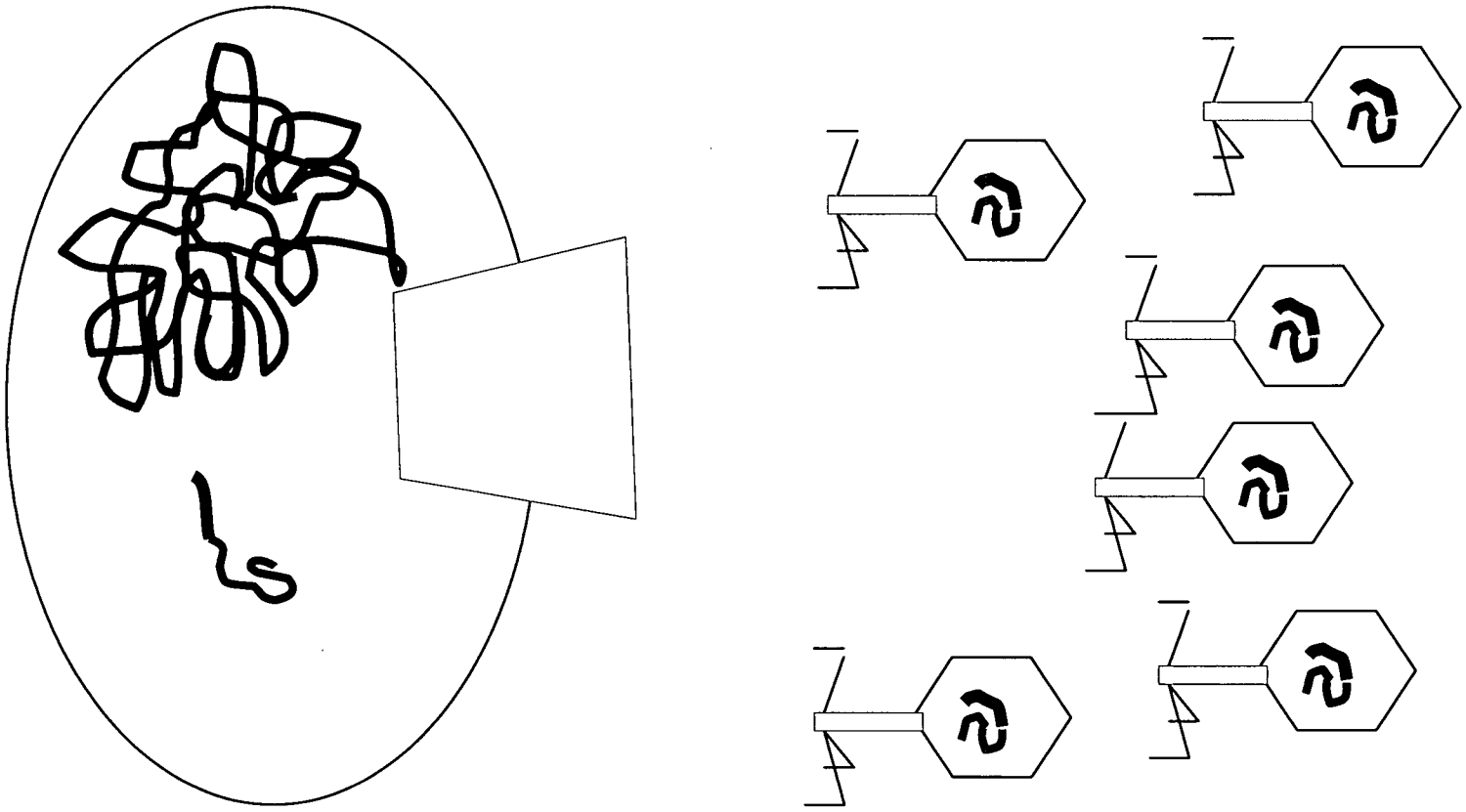
BACTERIOPHAGE

STARTING CELL

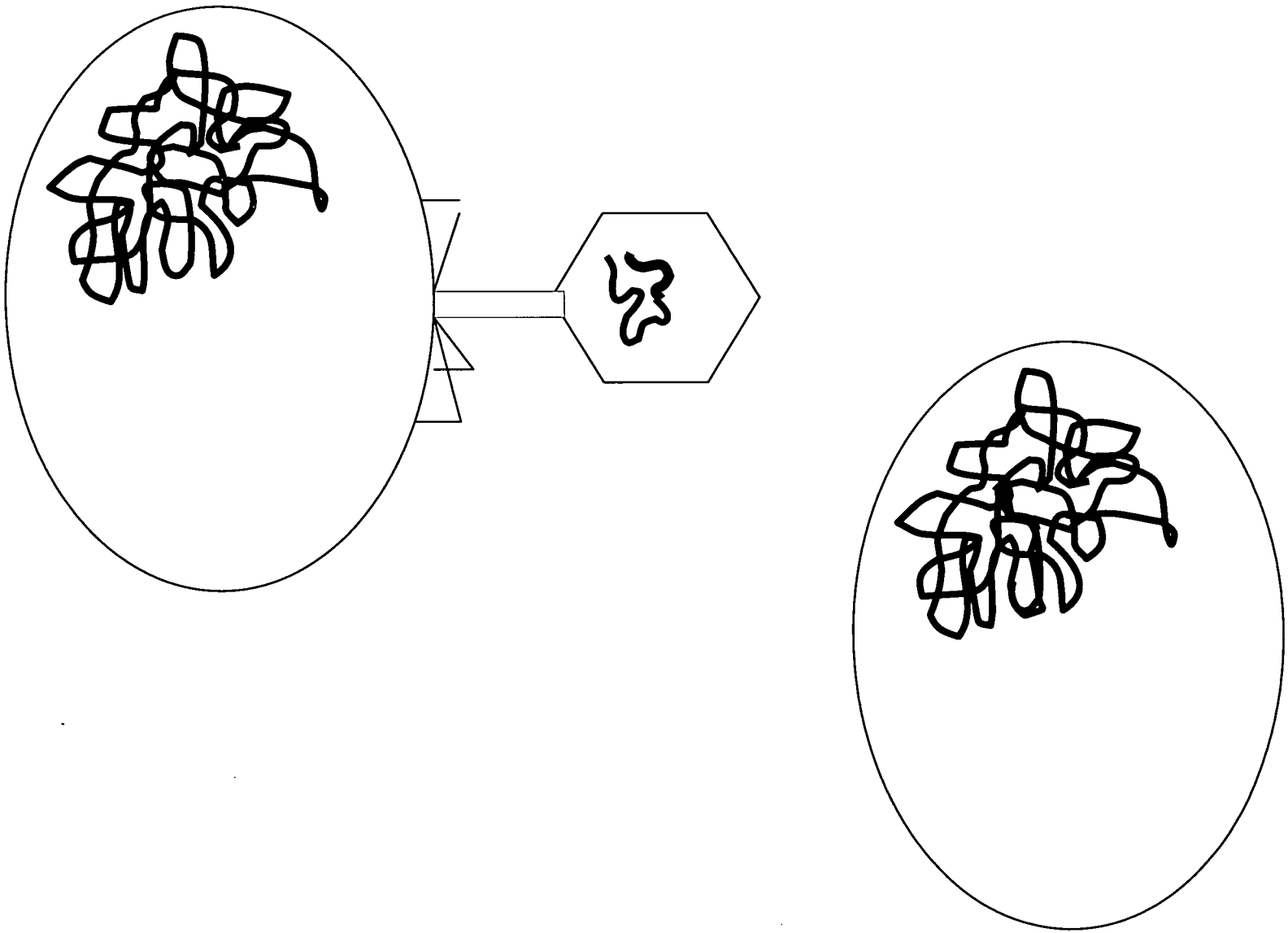
TRANSDUCTION, STEP 2



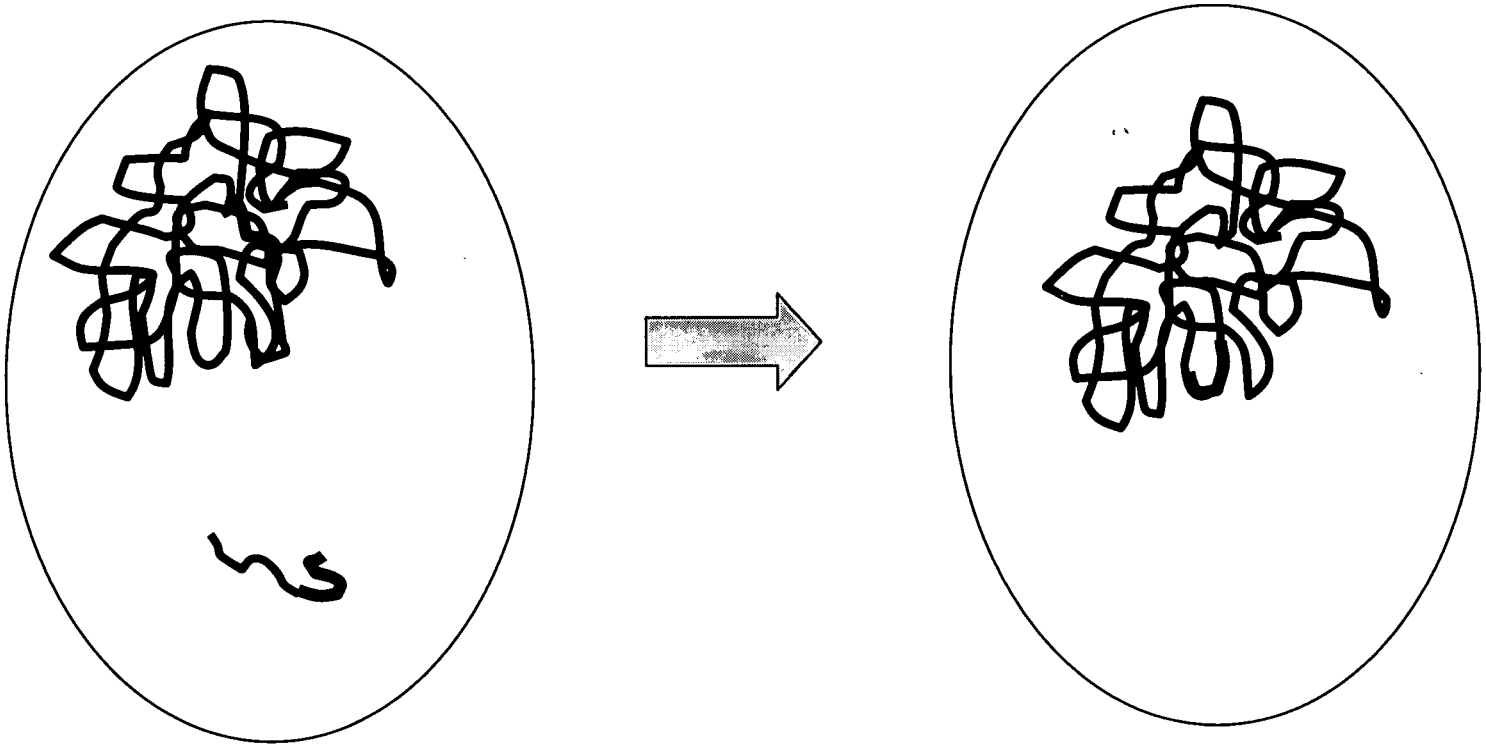
TRANSDUCTION, STEP 3



TRANSDUCTION, STEP 4

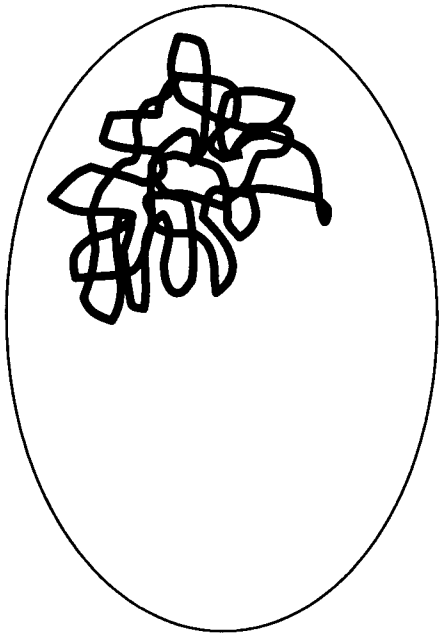


TRANSDUCTION, STEP 5

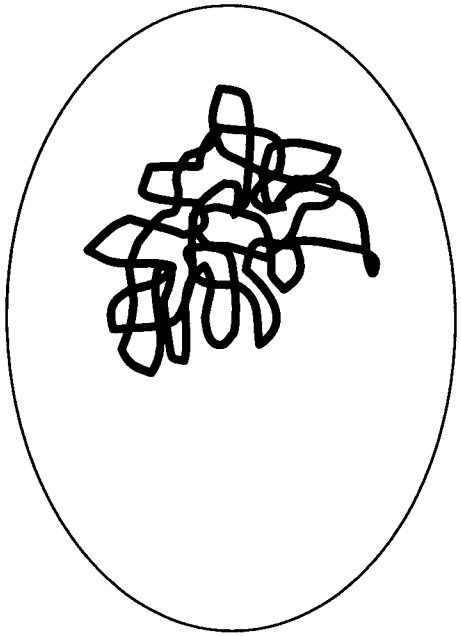


New recombinant cell

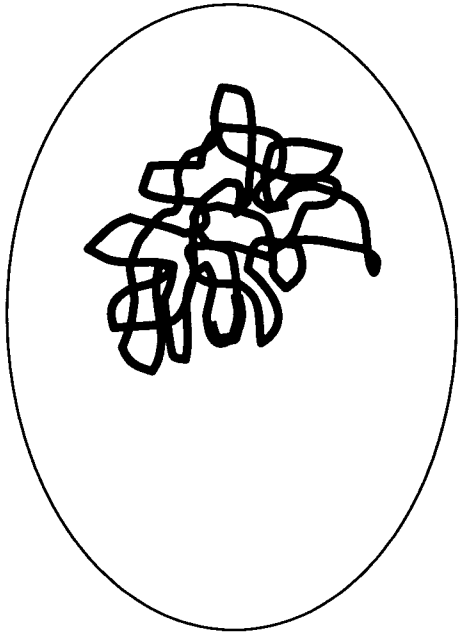
TRANSDUCTION COMPLETE



Starting cell (donor)



Another cell (recipient)



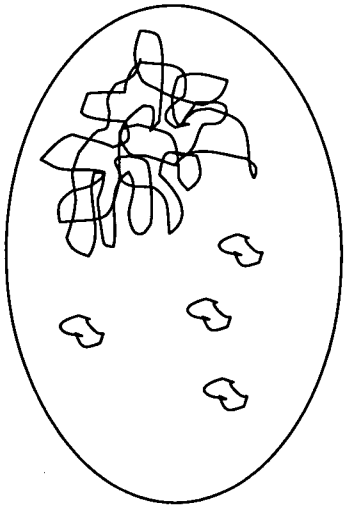
New recombinant cell

3. CONJUGATION

Conjugation occurs when related cells SHARE copies of special plasmids (F-plasmids or R-plasmids)

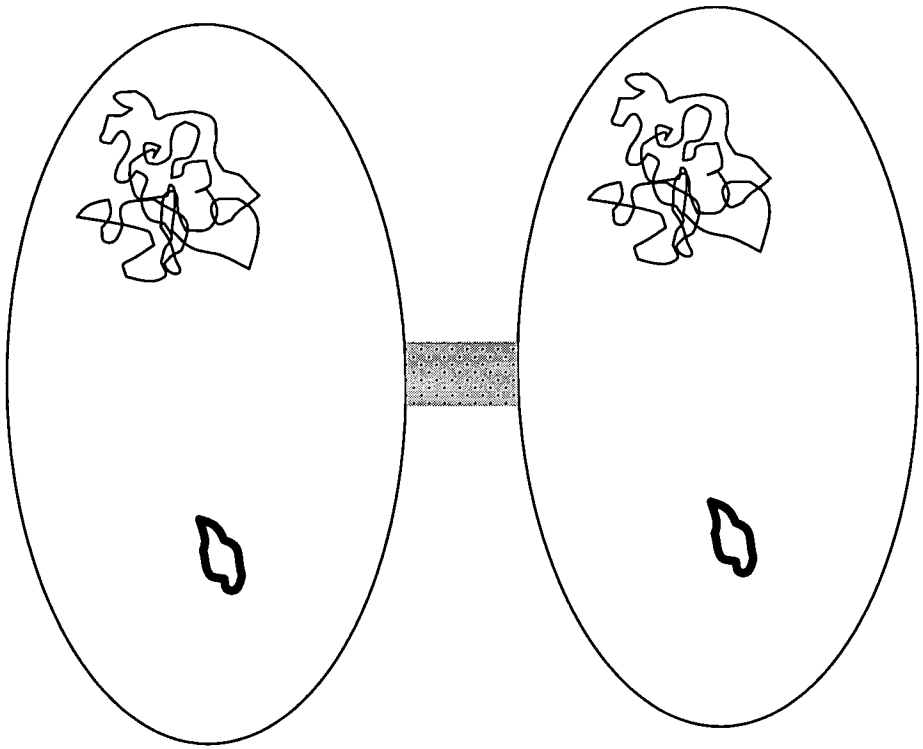
CONJUGATION

First, what is a plasmid????



- Extra-chromosomal DNA
- Gets copied independently of chromosome
- May or may not get carried into daughter cell
- Cell copies plasmid when gene products are needed

- Genes typically present may encode antibiotic or metal resistance proteins
- Closely related cells can SHARE plasmid copies



Donor cell (F+) passes a COPY of F into recipient cell (F-)

Recipient cell becomes F+

CONJUGATION

Requires a conjugative plasmid!

- The plasmid has special genes on it that facilitate conjugation

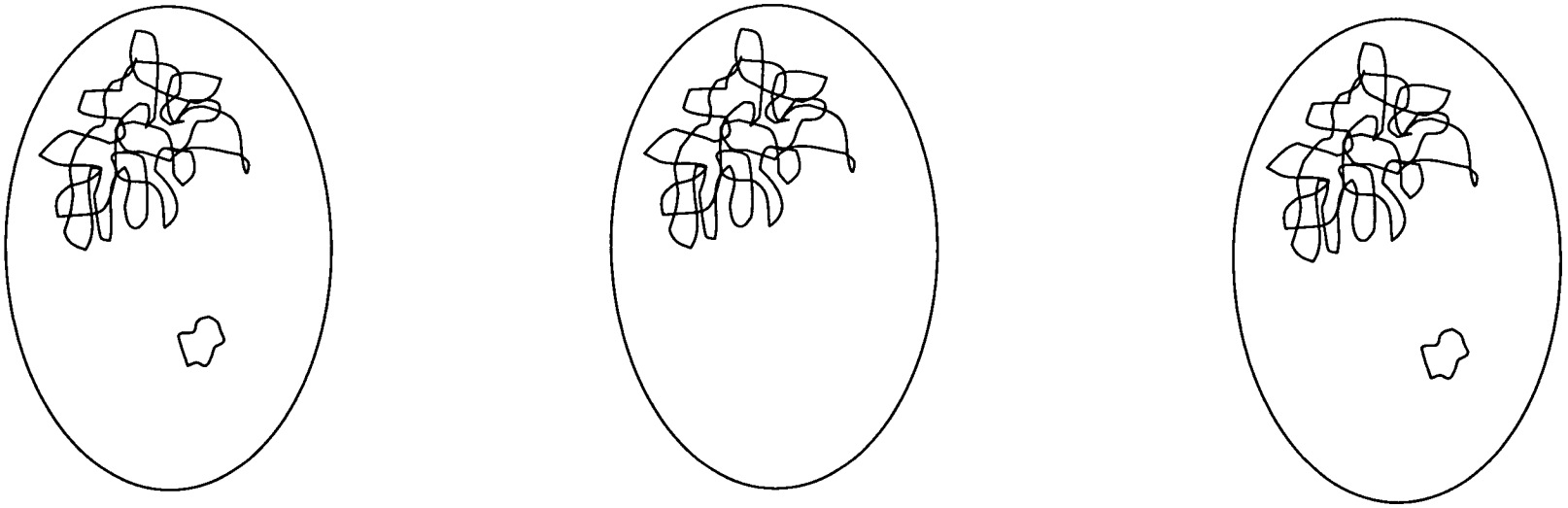
The plasmid genes are not necessary for the cell's growth and reproduction, but they add special abilities

- requires direct cell contact, sex pili involved

Special plasmid is called the F plasmid in E. coli

Cells with this plasmid are called F+ (without, F-)

When an F+ cell shares its plasmid with another cell - the new cell now has a plasmid it never had before. But it is not a recombinant. (Why?)



DONOR RECIPIENT 'NEW CELL'

A NEW RECOMBINANT CELL CAN OCCUR BY THE FOLLOWING MECHANISM:

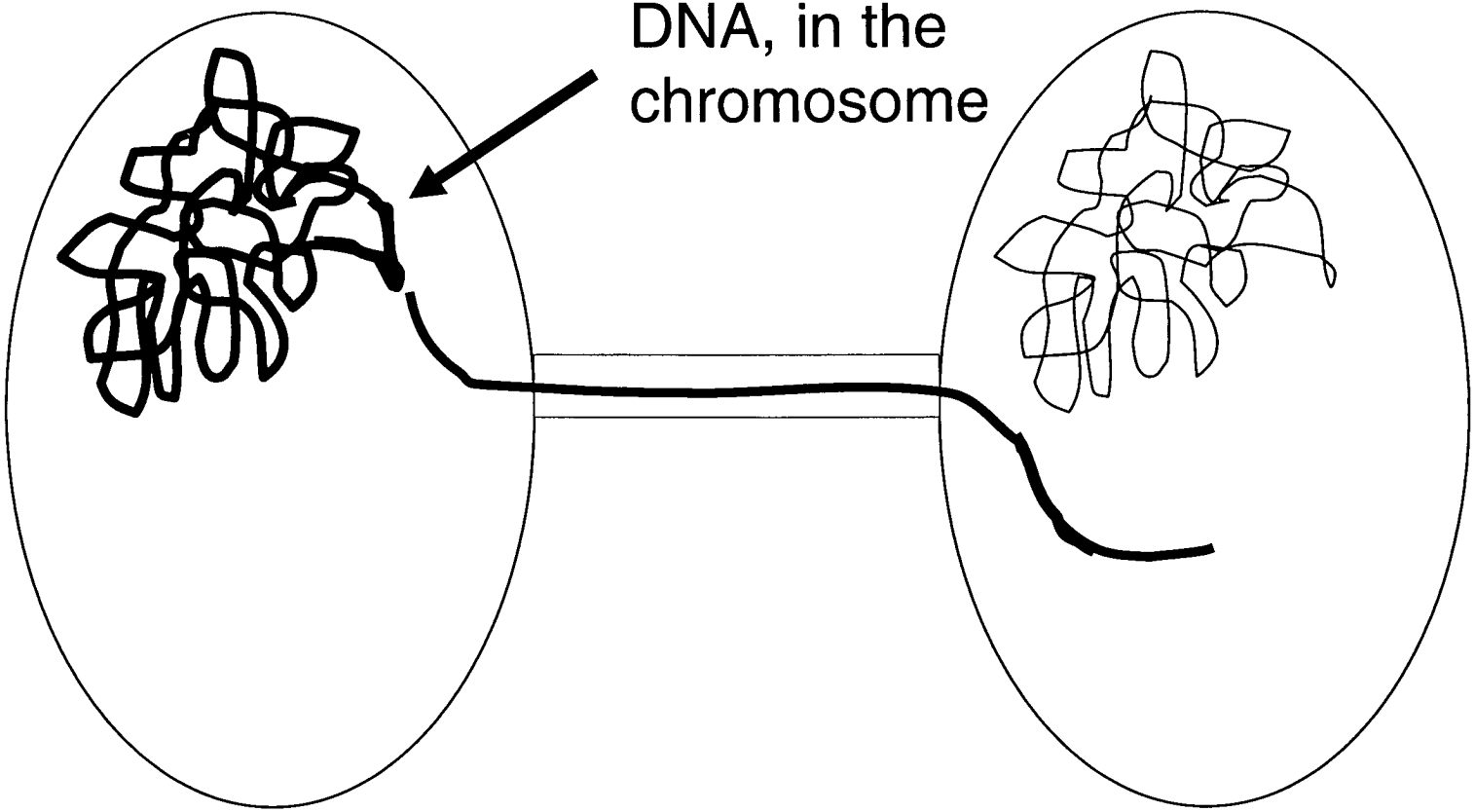
F factor genes can become integrated into the bacterial chromosome.

If they do - we say the cell is Hfr (High frequency of recombination).

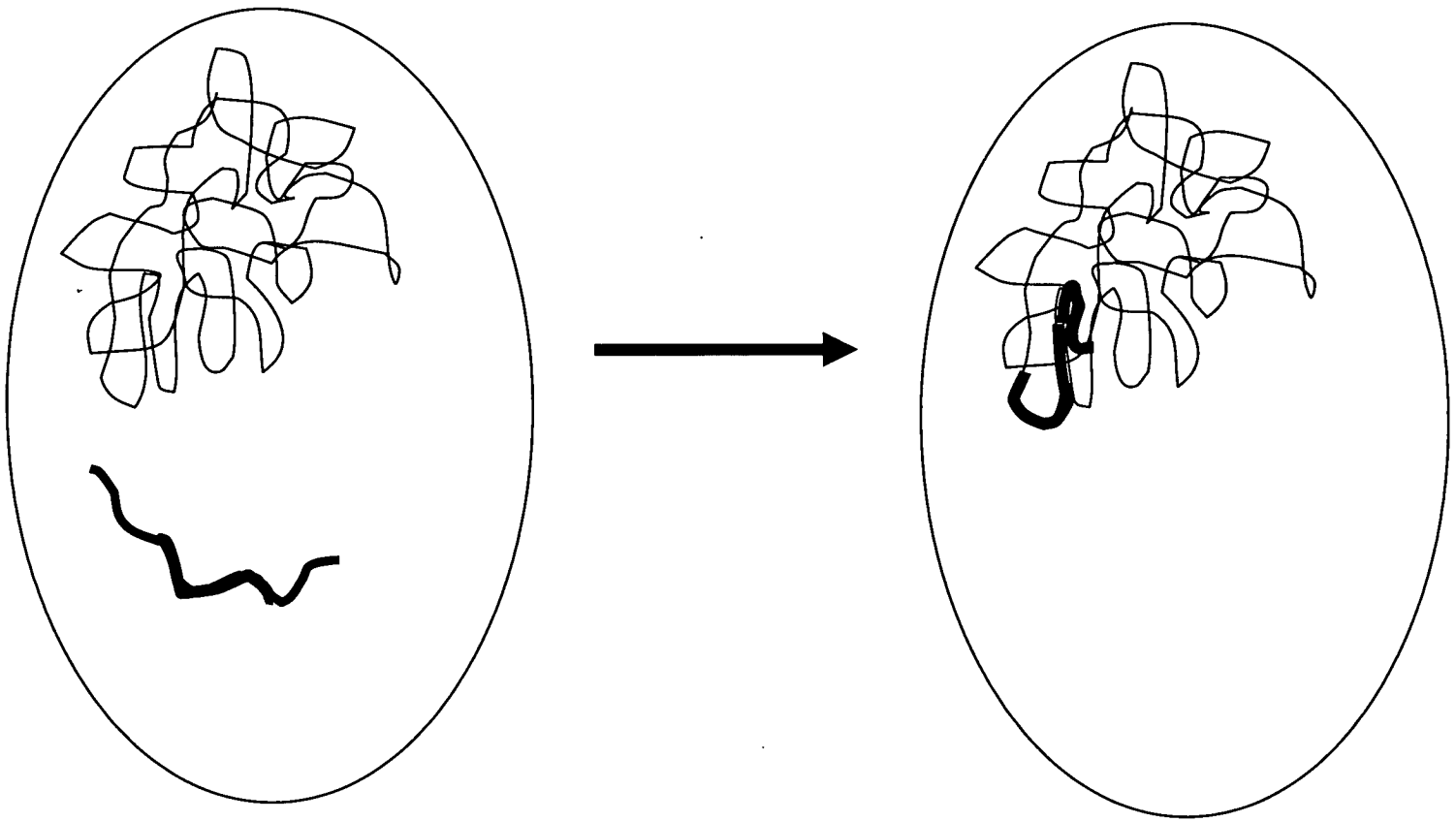
When an Hfr cell mates with an F- cell, conjugation begins just as we have described

But when the DNA is copied and sent into recipient cell, some of the rest of the chromosome may go too!

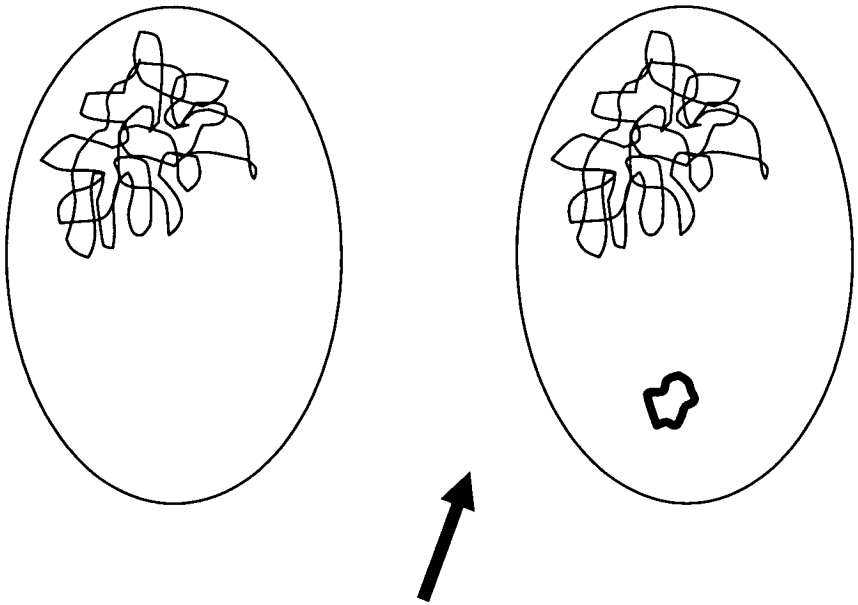
Then, recombination can occur, and the recipient cell has a new combination of genes in its chromosome.



Hfr cell

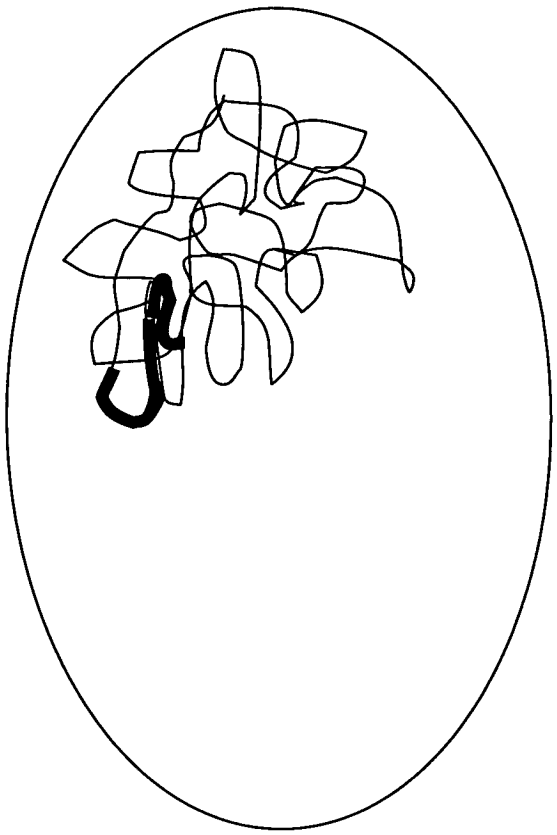


NEW RECOMBINANT CELL



Whereas this cell is not?

Why is this cell a recombinant -



REVIEW:

Bacterial cells CAN achieve variation through mutation

Bacterial cells also achieve new gene combinations through 3 unique processes

Transformation occurs when DNA pieces are taken up from the environment

•Conjugation occurs when cells share plasmids

Transduction occurs when new BACTERIAL genes are integrated into chromosome because of phage infection